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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,555	03/04/2002	Kanwal K. Raina	M4065.0206/P206A	7943

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EXAMINER

GUHARAY, KARABI

ART UNIT PAPER NUMBER

2879

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/086,555

Applicant(s)

RAINA, KANWAL K.

Examiner

Karabi Guharay

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 12-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 12-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

Amendment, filed on 10/29/2004 have been considered and entered.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 24-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Sandhu et al. (US 6086442).

Regarding claims 24, 27 & 28, Sandhu et al. disclose a field emission display device (Fig 3) comprising at least one current emitter (48) comprising a doped silicon (lines 20-22 of column 2), a substrate (60) having a phosphor coating (62) in at least one region positioned to receive electrons from the current emitter (lines 46-57 of column 4), the current comprising a current emission surface comprising doped silicon infused with nitrogen (treated with nitrogen plasma, thus nitrogen infused on the surface, lines 11-25 of column 3).

Regarding claim 25, though Sandhu et al. do not explicitly disclose that the current emission surface has atomic concentration of oxygen and silicon reduced to values smaller than the atomic concentration of oxygen and silicon of the current surface subjected to atmospheric conditions, Sandhu discloses plasma enhanced chemical vapor deposition process followed by nitrogen infusion process so that metal

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nitride is formed on the surface thus inherently has atomic concentration of oxygen and silicon reduced to values smaller than the atomic concentration of oxygen and silicon of the current surface subjected to atmospheric conditions, silicon layer when exposed to atmospheric conditions forms oxides (silicon dioxide) while in Sandhu's device for the presence of metal nitride layer oxidation cannot occur in Sandhu's emitter surface.

Regarding claims 26 & 29, Sandhu et al. disclose a field emission display device (Fig 3) comprising an array of current emitter (48) comprising a doped silicon (lines 20-22 of column 2), a substrate (60) having a phosphor coating (62) in at least one region positioned to receive electrons from the current emitter (lines 46-57 of column 4), the current comprising a current emission surface comprising doped silicon infused with nitrogen (treated with nitrogen plasma, thus nitrogen infused or deposited on the surface, lines 11-25 of column 3).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 12, 18, 19, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu et al. (US 6086442), and further in view of Jones (US 5371431).

Regarding claims 12 & 30, Sandhu et al. disclose a field emission display device (Fig 3) comprising at least one current emitter (48) formed of doped silicon

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(Column 2, lines 20-23), a substrate (60) having a phosphor coating (62) in at least one region positioned to receive electrons from the current emitters (Column 4, lines 46-57), the current emitter comprising current emission surface comprising doped silicon infused with nitrogen, since emitter surface is exposed to nitrogen plasma (lines 11-25 of column 3).

Sandhu et al. further disclose that the electron emitter comprises sides, but fail to disclose that at least a portion of the sides being surrounded by an insulating layer to prevent current from radiating out of the sides (Fig 3).

However, Jones discloses a field emission device (Fig 8, or Fig 11C) including electron emitter (metal column 12 with tip 15) having at least a portion of the sides of the emitter surrounded by an insulating layer 19 (lines 14-18 of column 12), insulating layer touching the sides of the emitter column 12 (see Fig 1 1C), thus preventing current from radiating out of the sides. This type of configuration of emitters and the insulating layer reduce the parasitic capacitance of the emitter and prevent charge transfer between the emitters (lines 17-20 of column 3).

Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide insulating layer surrounding at least a portion of the sides of the electron emitter, as disclosed by Jones, in the device of Sandhu et al., since this will reduce the parasitic capacitance of the emitter and also prevent charge transfer between emitters.

Regarding claim 18, Jones discloses that the current emitter comprises a

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tip (15) and the sides (sides of column 12) do not include any portion of the tip 15 (Fig 8, Fig 10E). The same reason for combining art as in claim 12 applies.

Regarding claim 19, Jones discloses that the insulating layer 19 includes silicon dioxide (Column 6, lines 34-35). The same reason for combining art as in claim 12 applies.

Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu et al. and Jones, as applied to claim 12 above, and further in view of Yamazaki (US 5840118).

Regarding claim 13, Jones discloses that the substrate (11) is a glass substrate (lines 12-14 of column 14) but fails to disclose a barrier film on the substrate.

However, Yamazaki teaches a glass substrate covered with a barrier film in order to prevent scattering of impurities from the glass substrate ( lines 4-8 of column 5).

Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a barrier film covering the glass substrate, as disclosed by Yamazaki, so that scattering of impurities from the glass substrate can be prevented.

Regarding claim 14, Yamazaki discloses that the barrier film comprises silicon dioxide (line 6 of column 5).

Regarding claim 15, Jones discloses that the current emitter has a base

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(12) on the barrier layer of the combined structure and a projecting top 15 connected with the base 12 (see Fig 1 1c).

Regarding claim 16, Jones discloses a conductive layer (17) deposited on the barrier layer of the combined structure (see Fig 8).

Regarding claim 17, Jones discloses that conductive layer (17) is a metal layer (lines 40-43 of column 8), but silent about particular metal. However, it is well known that aluminum is a suitable metal widely used for conductive layer. Further it is noted that applicant's specific metal, aluminum does not solve any of the stated problems or yield any unexpected result that is not within the scope of the teachings applied. Therefore it is considered to be a matter of choice, which a person of ordinary skill in the art would have found obvious to select aluminum as the material for the conductive layer (17).

Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu et al. and Jones, as applied to claim 12 above, and further in view of Cathey (US 6020683).

Regarding claim 20-21, Sandhu and Jones fail to disclose that silicon grid resides on the insulating layer (as claimed in claim 20) and further a metal layer resides on silicon grid layer (as claimed in claim 21).

However, Cathey discloses a field emission display device (Fig 2) having a silicon grid (42, line 10 of column 6) then a metal layer (60) on top of silicon grid on top of metal layer 60 in order to control operation of grid (lines 59-63 of column 4).

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Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a silicon grid and a metal layer on top of the silicon grid as disclosed by Cathey in the combined structure of Sandhu and Jones in order to control operation of grid or other circuit components.

Regarding claim 22, Jones discloses a passivation layer (54) on top of the grid (47 see Fig 8).

Regarding claim 23, Jones discloses that the passivation layer (54) comprises nitride.

### ***Response to Arguments***

Applicant's arguments filed 12/29/04 have been fully considered but they are not persuasive.

Sandhu et al. disclose treating the current emitter surface by nitrogen plasma as in case of applicant's current emitter discloses in specification. Thus Sandhu's current emitter is comprises doped silicon infused with nitrogen.

### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karabi Guharay whose telephone number is (571) 272-2452. The examiner can normally be reached on Monday-Friday 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Karabi Guharay*  
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